UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/995,814	11/29/2001	Shuji Doi	Q67430	9735

7590 01/31/2007

SUGHRUE MION, PLLC
2100 Pennsylvania Avenue, NW
washington, DC 20037-3213

EXAMINER	
YAMNITZKY, MARIE ROSE	
ART UNIT	PAPER NUMBER
1774	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/995,814	DOI ET AL.	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3 and 6-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3 and 6-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's amendment filed on January 08, 2007, which amends claim 1 and cancels claims 4 and 5 has been entered.

Claims 1, 3 and 6-27 are pending.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. The rejections under 35 U.S.C. 112, 1st and 2nd paragraphs, as set forth in the Office action mailed May 04, 2006 are overcome by claim amendment.

3. Claims 1, 3 and 6-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. (US 6,361,887 B1).

Shi et al. disclose fluorescent polymers comprising one or more repeating units similar to units of formula (1) and one or more repeating units of formula (8) as defined in present claim 1, wherein Ar_1 is similar to the group represented by formula (4) as defined in claim 1 wherein X_5 is $-CR_{21}=CR_{22}-$ and X_6 is $-CR_{30}=$, and similar to the group represented by formula (1') as defined in claim 3. Shi et al. disclose electroluminescent (EL) devices wherein the fluorescent polymer

is disposed between an anode and a cathode. For example, see the abstract, column 37, line 57-c. 38, l. 55 and the claims.

Each of polymers 68-71 having the formula shown in columns 15-16 of Shi's patent comprises a repeating unit of formula (8) wherein Ar_2 is represented by formula (2') as defined in present claim 1. (Note that the definitions of R_1 to R_4 as set forth in the first four lines of column 16 should apparently be set forth after the second formula spanning columns 15 and 16; compare to the second formula spanning columns 65 and 66 and accompanying definitions of R_1 to R_4.) Polymers 68-71 comprise a repeating unit similar to units of present formula (1) wherein Ar_1 is a group represented by present formula (4), and further represented by formula (1') as set forth in claim 3. In polymers 68 and 69, the naphthylene groups (the groups of present formulae (4) and (1')) are unsubstituted, whereas in polymer 70 the naphthylene groups are substituted by an alkyl group and in polymer 71 the naphthylene groups are substituted by an alkoxy group.

Shi's specific polymers differ from the polymers as defined in the present claims in that none of the specific polymers disclosed in the patent are polymers having units of formula (1) in which a naphthylene group (Ar_1) contains an alkoxyphenyl group as a substituent. However, "substituted aryl" is among the possibilities for the substituents on the naphthylene groups of Shi's polymers and "4-methoxypheny" [sic] is among the preferences taught by Shi et al. See column 3, lines 22-40. (Shi's polymer 70 comprises an alkoxyphenyl group, 4-methyloxyphenyl, as a substituent on the fluorenylene group instead of the naphthylene group.)

It would have been a *prima facie* obvious modification to one of ordinary skill in the art at the time of the invention to make polymers within Shi's guidelines other than the specific

polymers disclosed by Shi in order to provide a variety of polymers suitable for use as a luminescent material in an EL device as taught by Shi. One of ordinary skill in the art would have reasonably expected substituted polymers containing substituents specifically taught by Shi et al., especially those containing the preferred substituents taught by Shi et al., to be suitable for use as a luminescent material in an EL device.

Shi et al. also do not explicitly disclose the polystyrene reduced number-average molecular weight of the polymers as required by the present claims. Shi et al. disclose weight average molecular weights. For example see c. 37, l. 27-31 and Table 1 in c. 54. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum number average molecular weights for Shi's fluorescent polymers based on properties affected by molecular weight.

Regarding present claims 6 and 7, the prior art discloses polymers similar to the polymers as defined in present claim 1, wherein the polymers have amounts of repeating units within the ranges set forth in claims 6 and 7. In the aforementioned polymers 68-71, the total number of repeating units represented by formulae (1) and (8) is 75 mol% of all repeating units, and the amount of repeating units represented by formula (1) is about 67 mol% based on the total amount of repeating units represented by formulae (1) and (8).

Devices having the layer structure specified in claim 8, with claims 11-13 dependent therefrom, and in claim 18, with claims 21-23 dependent therefrom, are disclosed by Shi et al. (e.g. see c. 37, l. 57- c. 38, l. 55).

Further with respect to present claims 9, 10, 19 and 20, it would have been within the level of ordinary skill in the art at the time of the invention to include auxiliary layers based on the properties afforded by those layers. The layers required by claims 9, 10, 19 and 20 are suggested by Shi et al. (e.g. see c. 38, l. 32-43).

Further with respect to present claims 14-17 and 24-27, it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to utilize Shi's polymeric electroluminescent devices in articles which conventionally make use of electroluminescent devices.

4. Claims 1, 3 and 6-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. (EP 1 043 382 A2).

See the whole document, especially the claims and paragraphs [0014]-[0028], [0034] and [0042].

Noguchi et al. suggest polymeric fluorescent substances within the scope of the present claims.

The fourth and seventh formulae following "[Chemical formulae 9]" in paragraph [0019] suggest divalent groups represented by present formulae (6) and (7), respectively. The first, second, fifth and sixth formulae following "[Chemical formulae 10]" suggest divalent groups represented by present formulae (5), (2), (4) and (3), respectively.

The seventh formula following "[Chemical formulae 13]" suggests a divalent group represented by formula (2') as defined in present claim 1.

The fifth formula following "[Chemical formulae 10]" further suggests a divalent group represented by formula (1') as defined in present claim 3.

Noguchi et al. suggest the use of these polymeric fluorescent substances in polymer light emitting devices having the layer structures required by present claims 8-13 and 18-23. Noguchi et al. further suggest the use of polymer light emitting devices comprising these polymeric fluorescent substances in articles as claimed in present claims 14-17 and 24-27.

Regarding the requirement for at least one repeating unit comprising a naphthylene group (each of formulae (2) to (7) as defined in present claim 1 represent a naphthylene group) substituted by at least one alkoxyphenyl group, such repeating units are suggested by the prior art. The fourth and seventh formulae following "[Chemical formulae 9]" in paragraph [0019] and the first, second, fifth and sixth formulae following "[Chemical formulae 10]" are naphthylene groups. These naphthylene groups may be substituted by at least one alkoxyphenyl group such as when at least one of the R variables is an alkoxyphenyl group. As defined in paragraph [0020], R may represent an aryl group of 6 to 20 carbon atoms and as taught in paragraph [0042], an alkoxyphenyl group is an example of an aryl group of 6 to 20 carbon atoms.

Noguchi et al. do not disclose a specific example of a polymeric fluorescent substance meeting the limitations of the present claims, but suggest numerous polymers within the scope of the present claims. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make various polymeric fluorescent substances suggested by Noguchi et al. with the expectation that polymers comprising the divalent groups and substituted

by the substituents specifically taught by Noguchi et al. would be fluorescent and would be suitable for the purposes suggested in the prior art.

5. Applicant's arguments filed January 08, 2007 have been fully considered but they are not persuasive.

Applicant's arguments filed January 08, 2007 are the same as applicant's arguments filed February 09, 2006 with respect to the prior art rejections. The examiner's response to these arguments is substantially as set forth in the Office action mailed May 04, 2006.

The amendment filed January 08, 2007 incorporates the limitations of prior claim 4 into independent claim 1.

With respect to the rejection based on Shi et al., the present claim language does not exclude anthracene groups and/or the 9,10-di-(2-naphthyl)anthracene groups of Shi's polymers, and does not limit the pattern of distribution of repeating units of formula (1), formula (8), and any other repeating units which may be present in the polymer.

With respect to applicant's arguments that Shi et al. and Noguchi et al. do not teach an alkoxyaryl substituent on a naphthyl group, as previously noted, both prior art references teach alkoxyaryl substituents.

With respect to applicant's arguments regarding the favorable effect of using naphthylene groups having an alkoxyaryl substituent, the examiner notes that only polymeric fluorescent substance 13 (the polymer of Example 12), meets the limitations of the polymeric fluorescent substance as defined in present claim 1 (all other pending claims dependent directly or indirectly

therefrom). The examiner maintains the position that the data set forth in the specification do not demonstrate superior/unexpected results commensurate in scope with the present claims compared to the applied prior art.

6. Miscellaneous:

The examiner notes that the phrase "Ar_2 may have one or more substituents; when Ar_2 has a plurality of substituents, they may be the same or different;" (recited in the 5^{th}-3^{rd} lines from the end of claim 1) is superfluous given the earlier definitions of R_5', R_6', k' and l'.

7. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
January 29, 2007

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER

1774